

REMARKS

Claims 1-20 are now pending in the application. Claims 1 and 12 are amended. Claims 14-20 are added. No new matter is presented. Claims 1-10, 12, and 13 stand rejected under 35 U.S.C. § 102(e). Claim 11 is rejected under 35 U.S.C. 103(a). The above amendments and the following remarks are considered by Applicants to overcome each rejection raised by the Examiner and to place the application in condition for allowance. An early Notice of Allowance is therefore requested.

In view of the above amendments and the following remarks, Applicants requests the allowance of claims 1-13.

Claims 1-10, 12, and 13 stand rejected as being anticipated by Gotoh. (U.S. Patent No. 6,527,361). This rejection is traversed and believed overcome in view of the following discussion.

Gotoh is directed to an ink jet recording apparatus having a plurality of recording heads using inks of different lightness. Gotoh further discloses a method that includes an initial discharge step for discharging ink from a recording head, interrupting the discharge of ink for an appropriate period set in accordance with the ink lightness, and discharging ink again from the discharge ports of the recording head after the interruption.

Gotoh illustrates a flushing operation (“preliminary ejection”) which is interrupted by a predetermined pause, that is, interrupted discharge as indicated in Fig. 19B in which the pause of 0.5 second is provided between two intermittent ink ejecting cycles. Gotoh also illustrates a continuous discharge without a pause as indicated in Fig. 19A.

However, Gotoh et al. fails to teach or suggest a flushing control portion having a combination of the first and second modes of operation as recited in amended claims 1 and 12. Gotoh et al. provides a predetermined pause during the flushing operation, as indicated in Fig. 19B, for the purpose of mixing the ink in the regions 113S with the other ink portions during the pause following the first discharge (3), and effecting the second discharge (3') for

discharging the mixed ink, for reducing density inconsistencies to be generated during the following printing operation. See column 14, lines 28-51, in particular, lines 44-51.

As a result, Gotoh fails to teach or suggest the flushing control portion having the two modes of operation recited in amended claims 1 and 12, in which the non-ejection pause is provided and not provided, respectively. Furthermore, it is respectfully submitted that Gotoh would not render obvious the flushing control portion recited in amended claims 1 and 12. In this respect, it is noted that Gotoh discloses the interrupted discharge or flushing operation of Fig. 19B. In contrast, in the illustrated embodiment of Fig. 7 of the present application and recited in amended claim 11 and new claim 14, the flushing control portion is operated in the second mode before a predetermined time of 48 hours has passed after the installation of the ink cartridge on the ink jet head, and in the first mode after the predetermined time has passed. Therefore, in view of amendments to claim 1 and 12, Applicants respectfully submit that the claims 1 and 12, recite subject matter that is neither taught nor suggested by Gotoh. Accordingly, Applicants request the withdrawal of the rejection of claims 1 and 12 under 35 U.S.C. 102(e).

Claims 2-10 and 13 are dependent upon independent claims 1 and 12. Therefore, it is submitted that for at least the reasons mentioned above, claims 2-10 and 13 recite patentable subject matter. Accordingly, Applicants request the withdrawal of the rejection of claims 2-10 and 13 under 35 U.S.C. 102(b).

Claim 11 stands rejected under 35 U.S.C. 103(a) as being unpatentable over Gotoh in view of Matsumoto et al. (U.S. Patent No. 6,969,136 B1) This rejection is traversed and believed overcome in view of the following discussion.

Matsumoto is directed to an ink cartridge for a ink jet type printing apparatus having a print head. The ink cartridge includes a container having an ink chamber for containing ink, an ink supply port for ejecting the ink from the ink chamber to the print head, a memory device for storing data related to the ink or the ink cartridge, the memory device has an area

in which the data is stored in a rewritable matter, and a contact device enabling the transmission of data between the memory device and an external device. The memory device includes data indicative of the history of the ink cartridge which can be used to control a reproduction of the ink cartridge.

In rejecting original dependent claim 11, the Examiner relies upon Matsumoto et al. Matsumoto shows memory device 32 storing various kinds of data such as “data indicative of the time of attachment” of cartridge 10, 20 (col. 4, lines 4-9), “data indicative of the time of the ink end” (col. 4, lines 28-30), “production date, lifetime, the possible number of reproduction, and the other data” (col. 4, lines 41-44, and “residual amount of ink” (col. 5, lines 24-26). However, the Matsumoto does not teach the use of the “time of attachment” of the cartridge 10, 20, or the time elapse after the installation of the cartridge, for controlling the flushing operation described in col. 5, lines 11--22.

Thus, the subject matter of amended claims 1 and 12 as well as the subject matter of claims 11 and 14 would not have been obvious over Gotoh et al. in view of Matsumoto et al. It is also submitted that since claim 11 is dependent upon claim 1, claim 11 recites features that are neither taught nor suggested by the applied references. Therefore, Applicants request the withdrawal of the rejection of claim 11 under 35 U.S.C. 103(a). Therefore, Applicants request the withdrawal of the rejection of claim 11 under 35 U.S.C 103(a).

Claims 14-20 are added. No new matter is presented. It is respectfully submitted that the foregoing arguments apply to new claims 16 and 17 depending from new independent claim 15, and new claims 19 and 20 depending from new independent claim 18.

New independent claims 15 and 18 recite an ink jet printing apparatus comprising an ink jet head of piezoelectric type or a plurality of ink jet heads of piezoelectric type. Each ink jet head has a plurality of ink chambers, a plurality of ejection nozzles, and a piezoelectric actuator operable to pressurize an ink in selected ones of the ink chambers, for ejecting droplets of the ink from the corresponding ejection nozzles through ink passages. See Fig. 3.

On the other hand, the primary reference to Gotoh et al. shows only an ink jet head of bubble jetting type (col. 1, lines 30-37; and col. 7, lines 18-20) including heat generator 22 (col. 1, lines 53-57; Figs. 6a and 6b) or main heater 18 (col. 7, lines 1-17; and Fig. 9). For example, the main heater (ejection heater) 18 of Fig. 9 generates a bubble 14 for ejecting an ink droplet 15, as shown in Fig. 9.

As mentioned above, Gotoh discloses a predetermined pause between the two cycles of flushing operation as shown in Fig. 19B, for enabling the ink staying in the regions 113S to be mixed with the ink in the other regions 113R of common liquid chamber 113 (Figs. 17A and 17B) during the pause following the first discharge, and effecting the second discharge to discharge the mixed ink for reducing the density inconsistencies during the following printing operation, as described in column 14, lines 44-51. In Fig. 9, the common liquid chamber is indicated at 13 (col. 7, lines 20-22).

However, Gotoh fails to address the problem solved by the present invention defined in claims 1, 12, 15, and 18, that is, growth of air bubbles during a continuous flushing operation (paragraphs [0006] and [0007]), particularly while the degree of deaeration of the ink in the cartridge is relatively low and the air bubbles are relatively unlikely to be dissolved in the ink (paragraph [0047], lines 10-22). In other words, Gotoh does not recognize or solve the problem of air bubbles growing in the ink due to a pressure variation in the ink cartridge as a result of the continuous flushing operation of an ink jet head of piezoelectric type including a piezoelectric actuator. It should be noted that the heat generator 22 (Fig. 6a) or the main heater 18 (Fig. 9) of the bubble jetting type ink jet head is located comparatively close to the nozzle (10 in Fig. 6a, 11 in Fig. 9), while the ink chambers 16 formed adjacent to the piezoelectric actuator 20 of the piezoelectric type ink jet head are located away from the nozzle 15 by a comparatively large distance, in communication with the ejection nozzles through the ink passages. In the ink jet head of piezoelectric type, air bubbles existing

between the ink chambers and the ejection nozzles have larger adverse influence on the ejection of the ink droplets from the ejection nozzles, than air bubbles existing

Thus, it is further submitted that Gotoh is not interested in solving the problem of growth of air bubbles in the ink as a result of a continuous flushing operation. Therefore, the Gotoh showing the bubble jetting type ink jet head would not render obvious the flushing control portion operable to provide a non-ejection pause during a flushing operation of an ink jet head of piezoelectric type, as recited in new claims 15 and 18.

New claims 16 and 19 corresponding to claims amended claims 1 and 12, and new claims 17 and 20 corresponding to claims 11 and 14 should be given additional patentable weights. Applicants respectfully request the favorable consideration and allowance of new claims 14-20.

In view of the above amendments and remarks, Applicants submit claims 1-20 recite subject matter that is neither taught nor suggested by the applied references. Claims 1 and 12 are amended. No new matter is presented. Thus, for the reasons presented above, claims 1-20 are believed by Applicant to define patentable subject matter and should be passed to issue at the earliest possible time. A Notice of Allowance is requested.

Respectfully submitted,

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